

New Hampshire Volunteer Lake Assessment Program

2002 Bi-Annual Report for Snake River New Hampton



NHDES
Water Division
Watershed Management Bureau
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OBSERVATIONS & RECOMMENDATIONS

Concerned residents contacted the New Hampshire Department of Environmental Services' Biology Section in the spring of 2002 in regard to the impact of the operation of a summer camp and the potential expansion of the camp on the water quality and the integrity of the wetlands of the Snake River. The Snake River is located between Lake Winona and Lake Waukegan. Specifically, the Snake River begins at the outlet of Lake Winona and flows to the inlet of Lake Waukegan. The site of the summer camp and canoe launch site is located along the Snake River near the entrance to Lake Waukegan.

The VLAP Coordinator and the Limnology Center Director recommended that the residents conduct volunteer monitoring along the river to determine the baseline water quality of the river and to determine if the river experiences a decrease in water quality in response to the operation of the camp.

The residents sampled at four locations along the river on June 13th (prior to the operation of the camp) and on June 30th (during the operation of the camp.) Samples for pH, total phosphorus, conductivity and turbidity were collected and analyzed in the DES Limnology Center. Based on the information provided by the residents, Station 1 appears to be located immediately downstream of the camp, while stations 2, 3, and 4 appear to be located upstream of the camp (with Station 4 being located the furthest upstream at the outlet of lake Winona) .

After reviewing data collected from **SNAKE RIVER**, the program coordinators recommend the following actions.

TABLE INTERPRETATION

➤ **Table 4: pH**

Table 4 (Appendix B) presents the in-lake and tributary current year and historical pH data.

pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 5.5 severely limits the growth and

reproduction of fish. A pH between 6.5 and 7.0 is ideal for fish. The mean pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is 6.5, which indicates that the surface waters in state are slightly acidic. For a more detailed explanation regarding pH, please refer to page 16 of the "Chemical Monitoring Parameters" section of this report.

The pH on the June 13th sampling event ranged from **6.64** at Station 4 (located at the outlet of Lake Winona) to **6.62** at Station 1 (located downstream of the camp and near the inlet to Lake Waukegan). The pH on the June 30th sampling event ranged from **6.81** at Station 4 to **6.55** at Station 1.

This data indicates that the water in the river is ***slightly acidic***. In addition, the data indicates that the pH was approximately the same at all stations on both sampling events.

Due to the presence of granite bedrock in the state and the deposition of acid rain, there is not much that can be done to effectively increase lake/pond pH.

➤ **Table 6: Conductivity**

Table 6 in Appendix B presents the current and historic conductivity values for tributaries and in-lake data. Conductivity is the numerical expression of the ability of water to carry an electric current. For a more detailed explanation, please refer to page 16 of the "Chemical Monitoring Parameters" section of this report.

The conductivity on the June 13th sampling event ranged from **66.66 Mhos/cm** at Station 4 (located at the outlet of Lake Winona) to **77.89 uMhos/cm** at Station 1 (located downstream of the camp and near the inlet to Lake Waukegan). The conductivity on the June 30th sampling event ranged from **77.04** at Station 4 to **87.06** at Station 1.

This data indicates that the conductivity on both sampling events ***increased gradually*** as the river flowed from Station 4 to Station 1.

Overall, the conductivity in the river is ***moderate***. Typically conductivity levels greater than 100 uMhos/cm indicate the influence of human activities on surface water quality. activities include septic systems that fail and leak leachate into the groundwater (and eventually into the tributaries and the lake/pond), agricultural runoff, and road runoff (which contains road salt during the spring snow melt). New development in the watershed can alter runoff patterns and expose new soil and bedrock areas, which could contribute to increasing conductivity. In addition, natural sources, such as iron deposits in bedrock, can influence conductivity.

➤ **Table 8: Total Phosphorus**

Table 8 in Appendix B presents the current year and historic total phosphorus data for in-lake and tributary stations. Phosphorus is the nutrient that limits the algae's ability to grow and reproduce. Please refer to page 17 of the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

The total phosphorus concentration on the June 13th sampling event ranged from **9 ug/L** at Station 4 (located at the outlet of Lake Winona) to **12 ug/L** at Station 1 (located downstream of the camp and near the inlet to Lake Waukegan). The conductivity on the June 30th sampling event was **7 ug/L** at both Station 4 and Station 1.

These data indicate that the total phosphorus concentration on the June 13th sampling event **increased gradually** as the river flowed from Station 4 to Station 1. However, on the June 30th sampling event (during the operation of the camp), the total phosphorus concentration along the river from the outlet of Lake Winona to the inlet of Lake Waukegan, was **relatively low** and **consistent**.

➤ **Table 11: Turbidity**

Table 11 in Appendix B lists the current year and historic data for in-lake and tributary turbidity. Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is strongly influenced by turbidity. Please refer to page 19 of the "Other Monitoring Parameters" section of this report for a more detailed explanation.

The turbidity levels on the June 13th sampling event ranged from **0.97 NTUs** at Station 4 (located at the outlet of Lake Winona) to **0.69 NTUs** at Station 1 (located downstream of the camp and near the inlet to Lake Waukegan). The turbidity levels on the June 30th sampling event ranged from **0.6 NTUs** at Station 4 to **1.06 NTUs** at Station 1.

This data indicates that the turbidity along the river on the June 13th sampling event **was relatively low** along the entire length of the river from Lake Winona to Lake Waukegan. On the June 30th sampling event (during the operation of the camp), the turbidity of the river was **slightly elevated** at Station 1 (located downstream of the camp near the inlet) but the level was not high enough to be of concern.

OTHER COMMENTS

- The results of the samples collected along the Snake River do not show that the operation of the camp on June 30th had a negative impact on the water quality of the river with respect to the pH, conductivity, total phosphorus, and turbidity levels. If the residents

continue to be concerned about the impact of the camp on the water quality of the river, we recommend that the sampling program be expanded. Specifically, we recommend that additional sampling events be included prior to, during, and after the operation of the camp. It is difficult to determine water quality trends based on only two sampling events.

NOTES

- **Monitor's Note (6/30/02):** Camp in operation. While sampling, we observed canoes and motor boats traveling from the canoe launch site on the river, through the wetlands, to the lake. We have not observed loons since the camp began operation.

USEFUL RESOURCES

Changes to the Comprehensive Shoreland Protection Act: 2001 Legislative Session, NHDES Fact Sheet, (603) 271-3505, or www.des.state.nh.us/factsheets/sp/sp-8.htm

The Lake Pocket Book. Prepared by The Terrene Institute, 2000. (internet: www.terrene.org, phone 800-726-4853)

Organizing Lake Users: A Practical Guide. Written by Gretchen Flock, Judith Taggart, and Harvey Olem. Copies are available from the Terrene Institute (internet: www.terrene.org, phone 800-726-4853)

Proper Lawn Care in the Protected Shoreland: The Comprehensive Shoreland Protection Act, WD-SP-2, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/sp/sp-2.htm

Sand Dumping - Beach Construction, WD-BB-15, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-15.htm

Swimmers Itch, WD-BB-2, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-2.htm

Use of Lakes or Streams for Domestic Water Supply, WD-WSEB-1-11, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/ws/ws-1-11.htm

Weed Watchers: An Association to Halt the Spread of Exotic Aquatic Plants, WD-BB-4, NHDES Fact Sheet, (603) 271-3503 or www.des.state.nh.us/factsheets/bb/bb-4.htm